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## Research Aid

*People's Republic of China:  
Estimated Yuan Value of Foreign Trade  
In Machinery and Equipment 1951-73*

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PEOPLE'S REPUBLIC OF CHINA:  
ESTIMATED YUAN VALUE OF FOREIGN TRADE  
IN MACHINERY AND EQUIPMENT  
1951-73

I. INTRODUCTION

1. This research aid presents estimates of China's imports and exports of machinery and equipment for 1951-73. The estimates, which are in yuan (that is, in China's domestic currency), were derived from an earlier CIA study that developed estimates in US dollars.<sup>1</sup>

2. The new estimates were prepared primarily as a contribution to a broader study of the yuan value of capital formation in the Chinese economy. Previous research made it possible to estimate the yuan value of China's domestic production of machinery and equipment.<sup>2</sup> The results of the present paper now provide a basis for developing estimates in comparable yuan of the total value of the machinery and equipment component of China's capital expenditures—that is, domestic production plus net imports.

3. Section II is a brief overview of the conceptual and empirical problems involved in converting dollar values into yuan values in constant prices; it also explains the rationale for developing two sets of estimates—one using the official foreign exchange rate and the other using a rough-hewn approximation of the real purchasing power of the yuan in relation to foreign currencies. Section III describes the derivation of the estimates in detail, and Section IV compares the results of the two methods. Technical details and statistical tables are presented in the Appendix.

II. THE VALUATION PROBLEM IN BRIEF

4. Since the yuan is not a convertible currency, China must sell its exports in exchange for foreign goods or for currencies that are convertible. Similarly, it must pay for imports either by bartering its own wares or by drawing upon its holdings of convertible currencies. This raises fundamental conceptual and empirical questions regarding the valuation of China's trade. How do the Chinese convert these transactions into yuan? And is the Chinese method appropriate for a study of the real value of capital formation in the Chinese economy?

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<sup>1</sup> CIA, A(ER) 75-60, *People's Republic of China: Foreign Trade in Machinery and Equipment Since 1952*, January 1975.

<sup>2</sup> CIA, A(ER) 75-63, *Production of Machinery and Equipment in the People's Republic of China*, May 1975, and CIA, A(ER) 75-64, *Prices of Machinery and Equipment in the People's Republic of China*, May 1975.

5. Chinese discussions of the subject are ambiguous.<sup>3</sup> In the instance of imports of machinery and equipment, it appears that state trading corporations buy at foreign prices and then charge the end-using enterprises prices converted into yuan at the official exchange rate. In the case of exports, however, the trading corporations apparently buy from producing enterprises at established domestic prices in yuan and then sell abroad at whatever prices the goods will fetch in foreign currency.

6. This procedure separates foreign prices from domestic and creates distortions in China's financial accounts. Because Chinese exchange rates are fixed administratively by the central authorities, these rates do not reflect the real purchasing power of the yuan in foreign markets. In addition, the cross rates of exchange among the yuan, the dollar, and the ruble were inconsistent in 1957, the base year for this analysis.

7. It is clear, then, that what might be called "the Chinese method" is not an appropriate technique for measuring the real value of China's trade in machinery and equipment. Given the deficiencies of the Chinese exchange rates, is there an acceptable alternative technique? The answer is a guarded yes and involves a necessarily crude application of the standard Western technique for making international currency comparisons.<sup>4</sup> The acceptability of the technique rests on the assumption that the ratios between Chinese and foreign prices of comparable items of machinery and equipment are better indicators of relative purchasing power than are the official foreign exchange rates. This technique of course abstracts from the problem that Chinese prices, because they are also fixed administratively, do not necessarily reflect the relative scarcities of goods within the Chinese economy.

8. Because of data problems, the results generated by both methods are much less precise than desired. There are fundamental gaps in foreign trade data in foreign currencies. The actual exchange rates used by the Chinese are not definitely known. The sample of available Chinese prices is small and the information is sparse for matching these prices with comparable domestic prices in the United States, the Soviet Union, and elsewhere.

9. With these conceptual and empirical problems in mind, the next section of this paper presents the two contrasting approaches to the problem of estimating the yuan value of China's trade in machinery and equipment. The first approach, which is an approximation of the Chinese procedure, will be referred to as the exchange rate method; the alternative will be referred to as the purchasing power parity method.

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<sup>3</sup> Li Yung-hsing, "Uniform Method of Pricing Imported Commodities at Delivery," *Chi-hua ching-chi (Planned Economy)*, No. 4, 1958, p. 28, and Yeh Chi-chuang, "The Foreign Trade of China," *Jen-min jih-pao (People's Daily)*, 11 July 1957; translated in American Consulate General, Hong Kong, *Current Background*, No. 468, 22 July 1957.

<sup>4</sup> Irving B. Kravis et al., *A System of International Comparisons of Gross National Product and Purchasing Power*, Baltimore, 1975.

### III. CONTRASTING APPROACHES: TWO METHODS AND TWO SETS OF ESTIMATES

10. Basic data used in both methods consisted of the following:

- estimates in US dollars of Chinese trade in machinery and equipment with non-Communist countries, the Soviet Union, Eastern Europe, and other Communist countries;<sup>5</sup>
- adjustment factors for converting imports from an f.o.b. to a c.i.f. basis;<sup>6</sup> and
- adjustment factors applied to c.i.f. imports to account for handling and freight charges within China.<sup>7</sup>

With the exchange rate method, the basic data in dollars were converted into yuan according to the officially administered trade rates of exchange.<sup>8</sup> With the purchasing power parity method, the dollar data were converted into yuan according to rough estimates of the real purchasing power of the yuan in relation to the dollar (for trade with non-Communist countries) and in relation to the ruble (for trade with Communist countries).<sup>9</sup>

#### A. The Exchange Rate Method

11. In applying the exchange rate method, somewhat different procedures were used in estimating imports and exports and in adjusting the trade with non-Communist countries, the Soviet Union, Eastern Europe, and other Communist countries.

##### 1. Imports

12. Formulas used in the calculations were as follows:

$$V_{m}^{\$} = (1 + A_1)(1 + A_3)(1 + A_4)(\Sigma P_m^d Q_m)(E_d^f)$$

$$V_{m}^{\$} = (1 + A_3)(1 + A_4)(\Sigma P_m^d Q_m)(E_d^f)(E_f^f)$$

$$V_{m}^{\$} = (1 + A_2)(1 + A_3)(1 + A_4)(\Sigma P_m^d Q_m)(E_d^f)(E_f^f)$$

<sup>5</sup> These figures were taken directly from CIA, A(ER) 75-60, *op. cit.*, pp. 10-13, 33-34.

<sup>6</sup> Insurance and freight charges on trade with non-Communist countries were given as 3% in CIA, A(ER) 75-60, *op. cit.*, p. 33. Similar charges on trade with Eastern Europe and other Communist countries were estimated at 10%; see Joint Publications Research Service (JPRS), No. 10913, 31 October 1961, *Tieh-lu piao-chun she-chi yu-suan shou-tse (Standard Railway Design and Budget Handbook)*, Peking, 1960, p. 7. Because the Soviet Union and China share a contiguous border, c.i.f. values were considered equal to f.o.b. values in trade with the Soviet Union.

<sup>7</sup> Handling fees were given as 3% in Li Yung-hsing, *op. cit.* Average transport costs within China were estimated at 3.5%; see JPRS, No. 10913, *op. cit.*

<sup>8</sup> The appropriate foreign exchange rates prevailing in 1957 were 2.46 yuan per dollar, 4.00 rubles per dollar, and 1.00 yuan per ruble. The yuan/dollar rate was derived from the cross rates between the yuan and the British pound and the dollar and the pound—6.893 yuan per pound divided by 2.80 dollars per pound equals 2.46 yuan per dollar. These figures and the ruble/dollar rate are from *The Statesmans' Yearbook 1957*, London, pp. 115, 888, 1466. The yuan/ruble rate is given in I.P. Aizenberg, *Valutnii Sistema SSSR (The Currency System of the USSR)*, Moscow, 1962, pp. 149-151.

<sup>9</sup> Derivation of these rates and examples of the calculations are outlined in Section III, B, and Appendix Tables A-1 through A-5 below.

where  $V_m^{nc}$  = yuan value of imports from non-Communist countries.

$V_m^{su}$  = yuan value of imports from the Soviet Union.

$V_m^{ce}$  = yuan value of imports from Eastern Europe and other Communist countries.

$P_m^d$  = price of an imported good in 1957 dollars.

$Q_m$  = quantity of an imported good.

$E_d^j$  = yuan/dollar trade rate of exchange.

$E_d^r$  = ruble/dollar trade rate of exchange.

$E_r^j$  = yuan/ruble trade rate of exchange.

$A_1$  = estimated average international transport costs in trade with non-Communist countries.

$A_2$  = estimated average international transport costs in trade with Eastern Europe and other Communist countries.

$A_3$  = estimated Chinese markup for domestic handling charges.

$A_4$  = estimated average transport costs within China.

## 2. Exports

13. Formulas used in the calculations were as follows:

$$V_x^{nc} = (\sum P_x^d Q_x) (E_d^j)$$

$$V_x^{su} = (\sum P_x^d Q_x) (E_d^r) (E_r^j)$$

$$V_x^{ce} = (\sum P_x^d Q_x) (E_d^r) (E_r^j)$$

where  $V_x^{nc}$  = yuan value of exports to non-Communist countries.

$V_x^{su}$  = yuan value of exports to the Soviet Union.

$V_x^{ce}$  = yuan value of exports to Eastern Europe and other Communist countries.

$P_x^d$  = price of an exported good in dollars.

$Q_x$  = quantity of an exported good.

## B. The Purchasing Power Parity Method

14. Whereas the exchange rate method was relatively simple, the purchasing power parity method required more complicated procedures. These mainly involved the estimation of ratios between the prices in yuan and dollars and the prices in yuan and rubles for comparable items of machinery and equipment.

### 1. Yuan/Dollar Ratios for Trade with Non-Communist Countries

15. As a first step, unweighted price ratios were calculated for 10 items of machinery and equipment produced both in China and in the United States in 1957. These 10 ratios were then reduced to geometric mean ratios for 3 broad sectors—nonelectric machinery, electric machinery, and transport equipment.<sup>10</sup> Because the trade data disaggregated in this way were available only in current US dollars, it was also necessary to convert the data into constant dollars in

<sup>10</sup> Derivation of the yuan/dollar price ratios is shown in Appendix Table A-1 below.

1957 prices. This additional preliminary adjustment was accomplished by using a previously constructed deflating index.<sup>11</sup>

16. For Chinese imports, the formula used in the calculations was as follows:

$$V_m^{nc} = (1+A_1)(1+A_3)(1+A_4)(V_m^d) \left( \frac{100}{D} \right) (R_d^r)$$

where  $V_m^{nc}$  = yuan value of imports from the non-Communist countries in 1957 prices.

$V_m^d$  = dollar value of imports from the non-Communist countries in current prices.

$D$  = deflating index.

$R_d^r$  = import-weighted yuan/dollar purchasing power ratio.

17. In calculating the value of Chinese exports, a deflating index was not used. This assumed that Chinese export prices remained unchanged throughout the period, so that current prices were considered to be the equivalent of 1957 prices. The formula used in the calculations was as follows:

$$V_x^{nc} = (V_x^d) (R_d^r)$$

where  $V_x^{nc}$  = yuan value of exports to non-Communist countries.

$V_x^d$  = dollar value of exports to non-Communist countries.

$R_d^r$  = export-weighted yuan/dollar purchasing power ratio.

Examples of the calculations for imports and exports for the year 1956 are shown in Appendix Tables A-2 and A-3, respectively.

## 2. Yuan/Ruble Ratios for Trade with Communist Countries

18. Because enough price data were not available, a parallel technique of disaggregating the trade statistics into subsectors could not be employed in developing yuan/ruble price ratios. Instead, a single ratio—that for various types of machine tools—was used. For the Soviet Union, the ratio was the geometric mean of prices for 31 types of machine tools; for Eastern Europe, it was the geometric mean of prices for 51 types of machine tools.<sup>12</sup> Also, since the basic trade data were already stated in terms of 1957 US dollars,<sup>13</sup> there was no need to use a deflating index.

19. For imports from the Soviet Union, the formula used in the calculations was as follows:

$$V_m^{su} = (1+A_3)(1+A_4)(V_m^d)(E_d^r)(R_d^r)$$

where  $V_m^{su}$  = yuan value of imports from the Soviet Union.

$V_m^d$  = dollar value of imports from the Soviet Union.

$E_d^r$  = ruble/dollar trade rate of exchange.

$R_d^r$  = yuan/ruble purchasing power ratio.

<sup>11</sup> CIA, A(ER) 75-60, *op. cit.*, p. 34.

<sup>12</sup> Appendix Tables A-4 and A-5.

<sup>13</sup> CIA, A(ER) 75-60, *op. cit.*, pp. 8-9.



20. For imports from Eastern Europe and other Communist countries, the formula used in the calculations was as follows:

$$V_m^{\text{r}} = (1 + A_2)(1 + A_3)(1 + A_4)(V_m^d)(E_d^r)(R_r^r)$$

where  $V_m^{\text{r}}$  = yuan value of imports from Eastern Europe and other Communist countries.

$V_m^d$  = dollar value of imports from Eastern Europe and other Communist countries.

$E_d^r$  = ruble/dollar trade rate of exchange.

$R_r^r$  = yuan/ruble purchasing power ratio.

21. For exports to the Soviet Union, the formula used in the calculations was as follows:

$$V_x^{\text{r}} = (V_x^d)(E_d^r)(R_r^r)$$

where  $V_x^{\text{r}}$  = yuan value of exports to the Soviet Union.

$V_x^d$  = dollar value of exports to the Soviet Union.

22. For exports to Eastern Europe and other Communist countries, the formula used in the calculations was as follows:

$$V_x^{\text{r}} = (V_x^d)(E_d^r)(R_r^r)$$

where  $V_x^{\text{r}}$  = yuan value of exports to Eastern Europe and other Communist countries.

$V_x^d$  = dollar value of exports to Eastern Europe and other Communist countries.

The yuan/ruble purchasing power ratio for the Soviet Union was used on the assumption that Chinese prices would have been competitive with Soviet prices. Most of this trade was with non-European Communist countries such as North Korea and North Vietnam, to which both China and the Soviet Union were supplying similar types of machinery.

#### IV. COMPARISON OF THE TWO SETS OF ESTIMATES

23. For reasons outlined above, there is no wholly satisfactory method of converting the dollar or ruble value of China's trade in machinery and equipment into yuan. The techniques applied here required serious compromises compared with what might be considered an "ideal" method of conversion.

24. Estimates using the two contrasting methodologies are presented in the Summary Table. The results are substantially different for the 1950s, but less so for the 1960s and 1970s. In the case of imports, the exchange rate method yields figures that are 35% to 40% higher than those derived by the purchasing power parity method for the 1950s; later, the differences are only negligible to 20%. In the case of exports, the exchange rate method yields figures that are 30% to 35% higher for the 1950s; later, the differences are about 10% to 30%.

25. The differences are less in the 1960s and 1970s because the pattern of trade changed from that of the 1950s. Relative to the purchasing power parity method, the exchange rate method overvalues trade denominated in rubles and

Summary Table

Estimated Yuan Value of Chinese Foreign Trade in Machinery and Equipment

Million 1957 Yuan

	Trade Rate of Exchange		Purchasing Power Parity	
	Imports <sup>1</sup>	Exports <sup>2</sup>	Imports <sup>3</sup>	Exports <sup>4</sup>
1951	568.6	24.0	419.3	17.5
1952	819.0	8.2	600.3	6.0
1953	1,195.0	8.1	862.5	5.9
1954	1,681.4	188.4	1,199.0	137.2
1955	1,802.9	231.6	1,291.1	169.8
1956	2,346.2	205.9	1,710.0	151.5
1957	2,404.9	126.8	1,756.2	94.4
1958	3,072.7	148.9	2,216.8	113.9
1959	3,998.5	222.8	2,892.5	170.4
1960	3,615.6	147.8	2,614.4	113.1
1961	1,172.1	278.0	844.5	205.4
1962	432.7	273.0	313.5	204.4
1963	400.0	262.4	312.1	205.3
1964	605.4	232.0	494.5	176.7
1965	1,051.5	222.6	881.7	176.5
1966	1,494.3	249.1	1,292.1	199.5
1967	1,078.6	336.0	951.9	258.2
1968	842.3	352.6	682.9	275.9
1969	754.6	314.6	619.4	249.7
1970	1,252.2	298.5	1,188.9	257.4
1971	1,546.1	376.3	1,365.8	336.9
1972	1,639.0	380.9	1,414.0	334.6
1973	2,056.0	546.6	2,019.5	493.8

<sup>1</sup>Table A-9, column 5.

<sup>2</sup>Table A-14, column 3.

<sup>3</sup>Table A-10, column 5.

<sup>4</sup>Table A-14, column 6.

undervalues trade denominated in dollars. This is reflected in the inconsistent rates of exchange. The purchasing power parity method compensates for this anomaly by giving a greater yuan value for each dollar's worth of trade with the non-Communist countries and a lesser yuan value for each ruble's worth of trade with the Communist countries. In the 1950s Chinese trade was dominated by the Communist countries, so that the exchange rate method of calculation resulted in much higher total values than the purchasing power parity method. As China began to purchase (and sell) a greater proportion of items traded with non-Communist countries, the differences between the total values of the two methods became less.

26. The effects of two basic deficiencies in the available data warrant further comment—(1) the inconsistency among the trade rates of exchange and (2) the small size of the samples used to calculate the yuan/dollar and yuan/ruble price ratios.

27. As noted above, the exchange rates in 1957 were 1.00 yuan per ruble, 2.46 yuan per dollar, and 4.00 rubles per dollar.<sup>14</sup> For consistency, however, the ruble per yuan rate should have been 1.63 to 1.00 (4.00/2.46). In April 1950—at

<sup>14</sup> See footnote 8.

the time of the first trade agreement between China and the Soviet Union—the exchange rates among the yuan, the ruble, and the US dollar were consistent. The dual exchange rate system evolved because the ruble conversion rate was held constant while the official exchange rates for the yuan in relation to non-Communist currencies were changed. China's reasons for using dual exchange rates are not clear. Perhaps the Chinese held the ruble conversion rate constant because commodity prices fixed in the first Sino-Soviet trade agreement remained largely unchanged during 1950-57.<sup>15</sup>

28. The greatest weakness in the price ratios is the extremely small sample of prices for all items in Chinese trade with Communist countries and of prices for nonelectric machinery in Chinese trade with non-Communist countries. The addition of prices for even a few new items could change the ratios noticeably. A larger sample probably would raise both the yuan/dollar and yuan/ruble price ratios, particularly if the sample were broadened to include the prices of technologically advanced items of equipment.

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<sup>15</sup> Yeh Chi-chuang, *op. cit.*

## APPENDIX

### Statistical Tables

Table A-1

Sectoral Yuan/Dollar Price Ratios for Chinese Foreign Trade in 1957

	Price per Unit		Yuan/Dollar Ratio	
	Yuan <sup>1</sup>	US \$ <sup>2</sup>	Individual	Geometric Mean <sup>3</sup>
Nonelectric machinery .....				2.66
Tractors .....	21,000	4,590	4.58	
Machine tools <sup>4</sup> .....	10,200	5,705	1.79	
Diesel engines .....	147.98	43.29	3.42	
Electric machinery .....				1.88
Steam turbines .....	91.67	38.72	2.37	
Generators .....	57.14	51.00	1.12	
Transformers .....	25.99	9.01	2.88	
Electric motors .....	96.21	59.15	1.63	
Transport equipment .....				3.90
Trucks <sup>4</sup> .....	18,000	3,744	4.81	
Locomotives .....	756,800	218,750	3.46	
Gondola cars .....	19,389	6,700	2.89	

<sup>1</sup>CIA, A(ER) 75-64, *op. cit.*, May 1975.

<sup>2</sup>Abraham S. Becker, *Prices of Producers Durables in the United States and the USSR in 1955*, Rand Corporation, RM-2432, Santa Monica, 1959.

<sup>3</sup>Irving B. Kravis, *op. cit.*, p. 47.

<sup>4</sup>Because of their importance in trade, machine tools and trucks were each given a double weight.

Table A-2

Derivation of the Adjusted Yuan Value of Chinese Imports from Non-Communist Countries in 1956

	Thousand Current US \$ <sup>1</sup>	Thousand 1957 US \$ <sup>1</sup>	Yuan/Dollar Ratio <sup>2</sup>	Thousand 1957 Yuan
Nonelectric machinery .....	22,920	24,126	2.66	64,175
Electric machinery .....	6,565	6,911	1.88	12,993
Transport equipment .....	12,016	12,648	3.90	49,327
Subtotal .....	41,501	43,685	2.90	126,495
Other .....	54	57	2.90	165
<b>Total</b> .....	<b>41,555</b>	<b>43,742</b>	<b>....</b>	<b>126,660</b>

<sup>1</sup>CIA, A(ER) 75-60, *op. cit.*, pp. 23, 34. The deflating index for 1956 (1957=100) is 95.0.

<sup>2</sup>Table A-1, except for Subtotal (which is the weighted ratio for the three sectors) and Other (which is assumed to be the same as the ratio for Subtotal).

Table A-3

Derivation of the Adjusted Yuan Value of Chinese Exports to Non-Communist  
Countries in 1958

	Thousand 1957 US \$ <sup>1</sup>	Yuan/Dollar Ratio <sup>2</sup>	Thousand 1957 Yuan
Nonelectric machinery .....	1,449	2.66	3,854
Electric machinery .....	845	1.88	1,589
Transport equipment .....	173	3.90	675
Subtotal .....	2,467	2.48	6,118
Other .....	9	2.48	22
<b>Total .....</b>	<b>2,476</b>	<b>....</b>	<b>6,140</b>

<sup>1</sup> CIA, A(ER) 75-60, *op. cit.*, p. 27.

<sup>2</sup> Table A-1, except for Subtotal (which is the weighted ratio for the three sectors) and Other (which is assumed to be the same as the ratio for Subtotal).

Table A-4

Yuan/Ruble Price Ratios for Chinese and Soviet Machine Tools<sup>1</sup>

	Yuan	Rubles	Yuan/Ruble Ratio
General-purpose lathe .....	4,400	7,400	0.5946
Heavy-duty lathe .....	5,000	6,100	0.8197
Turret lathe .....	10,000	14,000	0.7143
Single-spindle automatic lathe .....	10,000	14,000	0.7143
Multiple-spindle lathe .....	5,700	8,300	0.6867
Vertical lathe .....	3,800	4,600	0.8261
Vertical drilling machine .....	4,200	6,900	0.6087
Radial drilling machine .....	4,000	4,500	0.8889
Multiple-spindle drilling machine .....	5,300	8,000	0.6625
Reclining warding machine .....	5,000	5,150	0.9709
External grinding machine .....	3,800	6,400	0.5938
Internal grinding machine .....	5,500	9,600	0.5729
Crankshaft grinding machine .....	4,000	5,400	0.7407
Horizontal grinding machine .....	4,000	6,100	0.6557
Centerless grinding machine .....	5,600	6,400	0.8750
Polishing and grinding machine .....	10,700	7,700	1.3896
Tool grinding machine .....	5,700	7,700	0.7403
Semiautomatic tool grinding machine .....	8,000	17,000	0.4706
Gear cutting machine .....	5,300	6,500	0.8154
Screw cutting machine .....	9,000	13,000	0.6923
Horizontal boring machine .....	6,000	7,400	0.8108
Vertical boring machine .....	6,900	7,900	0.8734
General-purpose milling machine .....	7,400	9,000	0.8222
Double housing planer .....	5,700	6,000	0.9500
Shaping and milling machine .....	8,200	20,600	0.3981
Milling machine .....	8,200	8,200	1.0000
Double housing planer .....	3,100	4,400	0.7045
Sawing machine .....	4,500	6,900	0.6522
Reaming machine .....	3,160	6,600	0.4788
Pipe cutting machine .....	7,500	9,500	0.7895
Sawing machine .....	3,300	4,700	0.7021
<b>Geometric mean of 31 types of machine tools .....</b>	<b>....</b>	<b>....</b>	<b>0.7275</b>

<sup>1</sup> JPRS, No. 10913, *op. cit.*, pp. 24-26. Soviet prices, which were given in yuan, were converted back to rubles at the rate of 1 ruble per yuan.

Table A-5

Yuan/Ruble Price Ratios for Chinese and East European Machine Tools<sup>1</sup>

	Yuan	Rubles	Yuan/Ruble Ratio
<b>Chinese and East German</b>			
General-purpose lathe .....	4,400	6,800	0.6471
Heavy-duty lathe .....	5,000	7,500	0.6667
Turret lathe .....	10,000	14,300	0.6993
Single-spindle automatic lathe .....	10,000	20,000	0.5000
Vertical lathe .....	3,800	5,800	0.6552
Vertical drilling machine .....	4,200	4,900	0.8571
Radial drilling machine .....	4,000	3,800	1.0526
Multiple-spindle drilling machine .....	5,300	7,800	0.6795
Reclining warding machine .....	5,000	3,600	1.3889
External grinding machine .....	3,800	7,600	0.5000
Internal grinding machine .....	5,500	11,400	0.4825
Crankshaft grinding machine .....	4,000	5,900	0.6780
Horizontal grinding machine .....	4,000	6,300	0.6349
Centerless grinding machine .....	5,600	13,000	0.4308
Polishing and grinding machine .....	10,700	11,500	0.9304
Tool grinding machine .....	5,700	11,900	0.4790
Gear cutting machine .....	5,300	11,200	0.4732
Screw cutting machine .....	9,000	7,500	1.2000
Horizontal boring machine .....	6,000	7,400	0.8108
Vertical boring machine .....	6,900	7,700	0.8961
General-purpose milling machine .....	7,400	7,400	1.0000
Double housing planer .....	5,700	5,400	1.0556
Shaping and milling machine .....	8,200	21,100	0.3886
Milling machine .....	8,200	7,100	1.1549
Double housing planer .....	3,100	3,600	0.8611
Sawing machine .....	4,500	9,000	0.5000
Reaming machine .....	3,160	4,400	0.7182
Sawing machine .....	3,300	6,400	0.5156
<b>Chinese and Czechoslovak</b>			
General-purpose lathe .....	4,400	7,800	0.5641
Heavy-duty lathe .....	5,000	6,100	0.8197
Turret lathe .....	10,000	10,200	0.9804
Single-spindle automatic lathe .....	10,000	22,000	0.4545
Vertical lathe .....	3,800	6,300	0.6032
Vertical drilling machine .....	4,200	9,100	0.4615
Radial drilling machine .....	4,000	4,100	0.9756
Multiple-spindle drilling machine .....	5,300	7,900	0.6709
Reclining warding machine .....	5,000	6,100	0.8197
External grinding machine .....	3,800	7,900	0.4810
Crankshaft grinding machine .....	4,000	5,600	0.7143
Horizontal grinding machine .....	4,000	4,300	0.9302
Centerless grinding machine .....	5,600	10,600	0.5283
Tool grinding machine .....	5,700	11,700	0.4872
Gear cutting machine .....	5,300	12,300	0.4309
Screw cutting machine .....	9,000	8,500	1.0588
Horizontal boring machine .....	6,000	16,300	0.3681
Vertical boring machine .....	6,900	9,900	0.6970
General-purpose milling machine .....	7,400	12,200	0.6066
Double housing planer .....	5,700	7,300	0.7808
Shaping and milling machine .....	8,200	14,000	0.5857
Double housing planer .....	3,100	5,500	0.5636
Reaming machine .....	3,160	4,300	0.7349
Geometric mean of 51 types of machine tools ....	....	....	0.6737

<sup>1</sup>JPRS, No. 10913, *op. cit.*, pp. 24-26. East German and Czechoslovak prices, which were given in yuan, were converted to rubles at the rate of 1 ruble per yuan.

Table A-6

## Chinese Imports of Machinery and Equipment From Non-Communist Countries

	F.O.B. Country of Origin <sup>1</sup> (Million 1957 US \$)	C.I.F. China <sup>2</sup> (Million 1957 US \$)	C.I.F. China at the Trade Rate of Exchange <sup>3</sup> (Million 1957 Yuan)	Yuan/Dollar Ratio	C.I.F. China at Purchasing Power Parity <sup>4</sup> (Million 1957 Yuan)
1951 .....	14.8	15.2	37.4	2.340	35.6
1952 .....	14.4	14.9	36.6	2.458	36.5
1953 .....	24.7	25.5	62.6	2.408	61.3
1954 .....	15.4	15.8	39.0	2.886	45.7
1955 .....	16.8	17.3	42.6	2.942	51.0
1956 .....	43.7	45.1	110.8	2.896	130.5
1957 .....	65.8	67.7	166.6	2.678	181.4
1958 .....	67.8	69.8	171.8	2.648	184.9
1959 .....	57.8	59.6	146.6	2.629	156.6
1960 .....	46.4	47.8	117.7	2.891	138.3
1961 .....	23.7	24.4	60.0	2.808	68.5
1962 .....	14.6	15.0	37.0	2.639	39.7
1963 .....	22.5	23.1	56.9	2.991	69.2
1964 .....	58.4	60.1	147.9	2.803	168.5
1965 .....	146.1	150.5	370.3	2.628	395.5
1966 .....	210.5	216.8	533.3	2.807	608.5
1967 .....	172.8	178.0	438.0	2.814	501.1
1968 .....	90.3	93.0	228.9	2.787	259.3
1969 .....	83.8	86.3	212.4	2.810	242.6
1970 .....	206.8	213.0	524.0	3.161	673.3
1971 .....	196.1	202.0	496.9	3.105	627.2
1972 .....	177.2	182.5	449.0	3.150	574.9
1973 .....	351.1	361.6	889.5	3.253	1,176.4

<sup>1</sup> CIA, A(ER) 75-60, *op. cit.*, p. 34. The 1951 and final 1973 data provided by the authors.

<sup>2</sup> Column 1 plus 3% (international transport costs), see CIA, A(ER) 75-60, *op. cit.*, p. 33.

<sup>3</sup> Column 2 times 2.46, the 1957 yuan/dollar exchange rate.

<sup>4</sup> Column 2 times varying purchasing power parity rates (see Appendix Table A-1).

Table A-7

## Chinese Imports of Machinery and Equipment from the Soviet Union

	F.O.B. Sino-Soviet Border <sup>1</sup> (Million Old Rubles)	C.I.F. China at the Trade Rate of Exchange <sup>2</sup> (Million Yuan)	C.I.F. China at Purchasing Power Parity <sup>3</sup> (Million Yuan)
1951.....	438.8	438.8	319.2
1952.....	626.1	626.1	455.5
1953.....	644.8	644.8	469.1
1954.....	794.6	794.6	578.1
1955.....	918.2	918.2	668.0
1956.....	1,218.9	1,218.9	886.7
1957.....	1,086.1	1,086.1	790.1
1958.....	1,271.7	1,271.7	925.2
1959.....	2,389.8	2,389.8	1,738.6
1960.....	2,015.5	2,015.5	1,466.3
1961.....	432.3	432.3	314.5
1962.....	109.3	109.3	79.5
1963.....	168.7	168.7	122.7
1964.....	230.8	230.8	167.9
1965.....	308.0	308.0	224.1
1966.....	344.8	344.8	250.8
1967.....	98.5	98.5	71.7
1968.....	59.6	59.6	43.4
1969.....	86.3	86.3	62.8
1970.....	65.5	65.5	47.7
1971.....	218.6	218.6	159.0
1972.....	337.0	337.0	245.2
1973.....	333.0	333.0	242.3

<sup>1</sup>CIA, A(ER) 75-60, *op. cit.*, p. 13; 1957 dollars converted to old rubles at 4 rubles per US dollar, except for 1972 (which is valued at 3.673 rubles per dollar) and 1973 (which is valued at 3.292 rubles per dollar).

<sup>2</sup>Column 1 converted to yuan at the rate of 1 yuan per ruble. Because the Soviet Union and China share a contiguous border, c.i.f. values were considered equal to f.o.b.

<sup>3</sup>Column 1 times 0.7275, the purchasing power parity rate (see Table A-4).



Table A-8

## Chinese Imports of Machinery and Equipment from Eastern Europe

	F.O.B. Country of Origin <sup>1</sup> (Million Old Rubles)	C.I.F. China <sup>2</sup> (Million Old Rubles)	C.I.F. China at the Trade Rate of Exchange <sup>3</sup> (Million Yuan)	C.I.F. China at Purchasing Power Parity <sup>4</sup> (Million Yuan)
1951 .....	52.0	57.2	57.2	38.5
1952 .....	96.0	105.6	105.6	71.1
1953 .....	376.0	413.6	413.6	278.6
1954 .....	676.0	743.6	743.6	501.0
1955 .....	664.0	730.4	730.4	492.1
1956 .....	792.0	871.2	871.2	586.9
1957 .....	912.0	1,003.2	1,003.2	675.9
1958 .....	1,308.0	1,438.8	1,438.8	969.3
1959 .....	1,104.0	1,214.4	1,214.4	818.1
1960 .....	1,144.0	1,258.4	1,258.4	847.8
1961 .....	552.0	607.2	607.2	409.1
1962 .....	236.0	259.6	259.6	174.9
1963 .....	136.0	149.6	149.6	100.8
1964 .....	172.0	189.2	189.2	127.5
1965 .....	280.0	308.0	308.0	207.5
1966 .....	476.0	523.6	523.6	352.7
1967 .....	432.0	475.2	475.2	320.1
1968 .....	456.0	501.6	501.6	337.9
1969 .....	372.0	409.2	409.2	275.7
1970 .....	532.0	585.2	585.2	394.2
1971 .....	668.0	734.8	734.8	495.0
1972 .....	683.2	751.5	751.5	506.3
1973 .....	641.9	706.1	706.1	475.7

<sup>1</sup>CIA, A(ER) 75-60, *op. cit.*, pp. 10-11; 1957 dollars converted to old rubles at 4 rubles per US dollar, except for 1972 (which is valued at 3.673 rubles per dollar) and 1973 (which is valued at 3.292 rubles per dollar).

<sup>2</sup>Column 1 plus 10% for transportation across the USSR.

<sup>3</sup>Column 2 converted to yuan at the rate of 1 yuan per ruble.

<sup>4</sup>Column 2 times 0.6737, the purchasing power parity rate (see Table A-5).

Table A-9

## Chinese Imports of Machinery and Equipment Valued at the Trade Rate of Exchange

Million 1957 Yuan

	C.I.F. China			Plus 3% Handling Fee <sup>3</sup>	Plus 3.5% Domestic Transport Cost <sup>4</sup>
	Non- Communist <sup>1</sup>	Communist <sup>2</sup>	Total		
1951.....	37.4	496.0	533.4	549.4	568.6
1952.....	36.6	731.7	768.3	791.4	819.0
1953.....	62.6	1,058.4	1,121.0	1,154.6	1,195.0
1954.....	39.0	1,538.2	1,577.2	1,624.5	1,681.4
1955.....	42.6	1,648.6	1,691.2	1,741.9	1,802.9
1956.....	110.8	2,090.1	2,200.9	2,266.9	2,346.2
1957.....	166.6	2,089.3	2,255.9	2,323.6	2,404.9
1958.....	171.8	2,710.5	2,882.3	2,968.8	3,072.7
1959.....	146.6	3,604.2	3,750.8	3,863.3	3,998.5
1960.....	117.7	3,273.9	3,391.6	3,493.3	3,615.6
1961.....	60.0	1,039.5	1,099.5	1,132.5	1,172.1
1962.....	37.0	368.9	405.9	418.1	432.7
1963.....	56.9	318.3	375.2	386.5	400.0
1964.....	147.9	420.0	567.9	584.9	605.4
1965.....	370.3	616.0	986.3	1,015.9	1,051.5
1966.....	533.3	868.4	1,401.7	1,443.8	1,494.3
1967.....	438.0	573.7	1,011.7	1,042.1	1,078.6
1968.....	228.9	561.2	790.1	813.8	842.3
1969.....	212.4	495.5	707.9	729.1	754.6
1970.....	524.0	650.7	1,174.7	1,209.9	1,252.2
1971.....	496.9	953.4	1,450.3	1,493.8	1,546.1
1972.....	449.0	1,088.5	1,537.5	1,583.6	1,639.0
1973.....	889.5	1,039.1	1,928.6	1,986.5	2,056.0

<sup>1</sup>Table A-6, Column 3.<sup>2</sup>Table A-7, Column 2, and Table A-8, Column 3.<sup>3</sup>Column 3 plus 3%, the estimated markup by the Chinese foreign trade corporations.<sup>4</sup>Column 4 plus 3.5%, the estimated average domestic transport cost.

Table A-10

## Chinese Imports of Machinery and Equipment Valued at Purchasing Power Parity

Million 1957 Yuan

	C.I.F. China			Plus 3% Handling Fee <sup>3</sup>	Plus 3.5% Domestic Transport Cost <sup>4</sup>
	Non- Communist <sup>1</sup>	Communist <sup>2</sup>	Total		
1951.....	35.6	357.7	393.3	405.1	419.3
1952.....	36.5	526.6	563.1	580.0	600.3
1953.....	61.3	747.7	809.0	833.3	862.5
1954.....	45.7	1,079.1	1,124.8	1,158.5	1,199.0
1955.....	51.0	1,160.1	1,211.1	1,247.4	1,291.1
1956.....	130.5	1,473.6	1,604.1	1,652.2	1,710.0
1957.....	181.4	1,466.0	1,647.4	1,696.8	1,756.2
1958.....	184.9	1,894.5	2,079.4	2,141.8	2,216.8
1959.....	156.6	2,556.7	2,713.3	2,794.7	2,892.5
1960.....	138.3	2,314.1	2,452.4	2,526.0	2,614.4
1961.....	68.5	723.6	792.1	815.9	844.5
1962.....	39.7	254.4	294.1	302.9	313.5
1963.....	69.2	223.5	292.7	301.5	312.1
1964.....	168.5	295.4	463.9	477.8	494.5
1965.....	395.5	431.6	827.1	851.9	881.7
1966.....	608.5	603.5	1,212.0	1,248.4	1,292.1
1967.....	501.1	391.8	892.9	919.7	951.9
1968.....	259.3	381.3	640.6	659.8	682.9
1969.....	242.6	338.5	581.1	598.5	619.4
1970.....	673.3	441.9	1,115.2	1,148.7	1,188.9
1971.....	627.2	654.0	1,281.2	1,319.6	1,365.8
1972.....	574.9	751.5	1,326.4	1,366.2	1,414.0
1973.....	1,176.4	718.0	1,894.4	1,951.2	2,010.5

<sup>1</sup>Table A-6, Column 5.<sup>2</sup>Table A-7, Column 3, and Table A-8, Column 4.<sup>3</sup>Column 3 plus 3%, the estimated markup by the Chinese foreign trade corporations.<sup>4</sup>Column 4 plus 3.5%, the estimated average domestic transport cost.

Table A-11

## Chinese Exports of Machinery and Equipment to Non-Communist Countries

	F.O.B. China <sup>1</sup> (Thousand 1957 US \$)	F.O.B. China at the Trade Rate of Exchange <sup>2</sup> (Thousand Yuan)	Yuan /Dollar Ratio	F.O.B. China at Purchasing Power Parity <sup>3</sup> (Thousand Yuan)
1951.....	9	22	3.900	35
1952.....	86	212	2.438	210
1953.....	43	106	2.558	110
1954.....	150	369	2.533	380
1955.....	1,462	3,597	2.648	3,871
1956.....	2,403	5,911	2.482	5,964
1957.....	2,760	6,790	2.572	7,099
1958.....	6,875	16,912	2.603	17,896
1959.....	9,268	22,799	2.685	24,885
1960.....	6,417	15,786	2.661	17,076
1961.....	4,049	9,961	2.579	10,442
1962.....	5,285	13,001	2.868	15,157
1963.....	10,750	26,445	3.125	33,594
1964.....	9,758	24,005	2.589	25,263
1965.....	17,319	42,605	2.628	45,514
1966.....	21,583	53,094	2.635	56,871
1967.....	19,531	48,046	2.494	48,710
1968.....	23,012	56,610	2.635	60,637
1969.....	25,434	62,568	2.612	66,434
1970.....	43,273	106,452	2.719	117,659
1971.....	63,526	156,274	2.785	176,920
1972.....	60,778	149,514	2.736	166,289
1973.....	92,393	227,287	2.830	261,472

<sup>1</sup>CHA, A(ER) 75-60, *op. cit.*, p. 33.<sup>2</sup>Column 1 times 2.46, the yuan/dollar exchange rate.<sup>3</sup>Column 1 times the varying purchasing power parity rates (see Table A-1).

Table A-12  
Chinese Exports of Machinery and Equipment to the Soviet Union<sup>1</sup>  
F.O.B. China

	Million Old Rubles <sup>2</sup>	At the Trade Rate of Exchange <sup>3</sup> (Million Yuan)	At Purchasing Power Parity <sup>4</sup> (Million Yuan)
1951.....	24.0	24.0	17.5
1952.....	8.0	8.0	5.8
1953.....	8.0	8.0	5.8
1954.....	40.0	40.0	29.1
1955.....	40.0	40.0	29.1
1956.....	36.0	36.0	26.2
1957.....	24.0	24.0	17.5
1958.....	16.0	16.0	11.6
1959.....	48.0	48.0	34.9
1960.....	4.0	4.0	2.9
1961.....	Negl.	Negl.	Negl.
1962.....	36.0	36.0	26.2
1963.....	28.0	28.0	20.4
1964.....	24.0	24.0	17.5

<sup>1</sup> Exports of machinery and equipment to the Soviet Union were negligible during 1965-73.

<sup>2</sup> CIA, A(ER) 75-60, *op. cit.*, p. 9; converted to old rubles at the rate of 4 rubles per US dollar.

<sup>3</sup> Column 1 converted to yuan at the rate of 1 yuan per ruble.

<sup>4</sup> Column 1 times 0.7275, the purchasing power parity rate (see Table A-4).

Table A-13

## Chinese Exports of Machinery and Equipment to Eastern Europe and Other Communist Countries

F.O.B. China

	Million Old Rubles <sup>1</sup>	At the Trade Rate of Exchange <sup>2</sup> (Million Yuan)	At Purchasing Power Parity <sup>3</sup> (Million Yuan)
1951.....	....	....	....
1952.....	....	....	....
1953.....	....	....	....
1954.....	148.0	148.0	107.7
1955.....	188.0	188.0	136.8
1956.....	164.0	164.0	119.3
1957.....	96.0	96.0	69.8
1958.....	116.0	116.0	84.4
1959.....	152.0	152.0	110.6
1960.....	128.0	128.0	93.1
1961.....	268.0	268.0	195.0
1962.....	224.0	224.0	163.0
1963.....	208.0	208.0	151.3
1964.....	184.0	184.0	133.9
1965.....	180.0	180.0	131.0
1966.....	196.0	196.0	142.6
1967.....	288.0	288.0	209.5
1968.....	296.0	296.0	215.3
1969.....	252.0	252.0	183.3
1970.....	192.0	192.0	139.7
1971.....	220.0	220.0	160.0
1972.....	231.4	231.4	168.3
1973.....	319.3	319.3	232.3

<sup>1</sup>CIA, A(ER) 75-60, *op. cit.*, p. 9; 1957 dollars converted to old rubles at 4 rubles per US dollar, except for 1972 (which is valued at 3.673 rubles per dollar) and 1973 (which is valued at 3.292 rubles per dollar).

<sup>2</sup>Column 1 converted to yuan at the rate of 1 yuan per ruble.

<sup>3</sup>Column 1 times 0.7275, the same purchasing power parity rate for exports to the Soviet Union.

Table A-14

## Valuation of Chinese Exports of Machinery and Equipment

Million 1957 Yuan

	Trade Rate of Exchange			Purchasing Power Parity		
	Non-Communist <sup>1</sup>	Communist <sup>2</sup>	Total	Non-Communist <sup>3</sup>	Communist <sup>4</sup>	Total
1951.....	Negl.	24.0	24.0	Negl.	17.5	17.5
1952.....	0.2	8.0	8.2	0.2	5.8	6.0
1953.....	0.1	8.0	8.1	0.1	5.8	5.9
1954.....	0.4	188.0	188.4	0.4	136.8	137.2
1955.....	3.6	228.0	231.6	3.9	165.9	169.8
1956.....	5.9	200.0	205.9	6.0	145.5	151.5
1957.....	6.8	120.0	126.8	7.1	87.3	94.4
1958.....	16.9	132.0	148.9	17.9	96.0	113.9
1959.....	22.8	200.0	222.8	24.9	145.5	170.4
1960.....	15.8	132.0	147.8	17.1	96.0	113.1
1961.....	10.0	268.0	278.0	10.4	195.0	205.4
1962.....	13.0	260.0	273.0	15.2	189.2	204.4
1963.....	26.4	236.0	262.4	33.6	171.7	205.3
1964.....	24.0	208.0	232.0	25.3	151.4	176.7
1965.....	42.6	180.0	222.6	45.5	131.0	176.5
1966.....	53.1	196.0	249.1	56.9	142.6	199.5
1967.....	48.0	288.0	336.0	48.7	209.5	258.2
1968.....	56.6	296.0	352.6	60.6	215.3	275.9
1969.....	62.6	252.0	314.6	66.4	183.3	249.7
1970.....	106.5	192.0	298.5	117.7	139.7	257.4
1971.....	156.3	220.0	376.3	176.9	160.0	336.9
1972.....	149.5	231.4	380.9	166.3	168.3	334.6
1973.....	227.3	319.3	546.6	261.5	232.3	493.8

<sup>1</sup>Table A-11, Column 2.<sup>2</sup>Table A-12, Column 2, and Table A-13, Column 2.<sup>3</sup>Table A-11, Column 4.<sup>4</sup>Table A-12, Column 3, and Table A-13, Column 3.